voltage DC source to high voltage DC source. The DC-to-DC Converter 138 attaches to the high voltage DC Bus 136 which is attached to the High Voltage Battery 134.

Claims

What is claimed is:

1. A Home Power Unit ("HPU") Apparatus to act as a battery charger or generator in a Hybrid Electric Vehicle ("HEV") comprising:

   A Transformer to convert electrical voltages;

   Inverter means to convert DC to AC;

   Rectifier means to convert AC to DC;

   A Control Unit;

   Connection means to the HEV and external electrical loads or source; and,

   Switching means to Change operation between charger and generator function.

2. The apparatus of Claim 1 wherein the Transformer, through the connection means, connects to external electrical loads or sources.

3. The apparatus of Claim 1 wherein the HPU connects to the HEV's high voltage DC Bus.

4. The apparatus of Claim 1 wherein the control unit connects to the HEV's system controllers.

5. The apparatus of Claim 4 wherein the control unit connects to the HEV's Battery Electronic Control Unit.

6. The apparatus of Claim 1 wherein the switching means comprises a momentary two position switch on the instrument panel.

7. The apparatus of Claim 1 wherein the switching means comprises a menu selection from a on-screen display mounted on the instrument panel.

8. The apparatus of Claim 1 wherein the switching means comprises a two position switch mounted on the HPU.

9. A method of using an apparatus in a Hybrid Electric Vehicle ("HEV") that functions as a battery charger and generator for external electrical devices comprising:

Switching means to control apparatus functions (charger or generator);

Communicating apparatus function and operation with the HEV;

Converting an electric source from AC to DC (charging functions) or DC to AC (generator functions); and,

10. The method of Claim 9 further comprising:

Converting voltage sources from one voltage to another.

11. The method of Claim 9 further comprising energy safety features to insure safe operation.

12. A system to use Hybrid Electric Vehicles (HEVs) as a power source to operate external electrical devices comprising:

An engine to operate a generator;

The generator to create electrical power;

Inverter/Rectifier means to convert electrical sources from AC to DC or DC to AC;

A high voltage DC Bus to connect the system's components switching means to alter the electrical power flow from vehicle function to HPU function; and,

Connection means to connect the HEV to external electrical devices.

13. The system of Claim 12 further comprising:

A Transformer to convert voltage sources.

14. The system of Claim 12 wherein the inverter/rectifier means comprises:

A generator inverter to convert AC power from the generator to DC power for the High Voltage DC Bus; and,

A traction inverter that converts DC power from the High Voltage DC Bus to AC power for the switching means.

15. The system of Claim 12 further comprising filter means to remove signal noise from electrical sources.

16. The system of Claim 12 wherein the switching means comprises a contactor that routes AC power from the traction inverter to the vehicle function, a traction motor, or the HPU function, the filter.

17. A Hybrid Electric Vehicle (HEV) system that functions as a battery charger or a generator for external electrical devices comprising:

On engine to operate a generator;

The generator to create electrical power;

Inverter/Rectifier means to covert electrical sources from AC to DC or DC to AC; and,

Connection means to connect the HEV to external electrical devices.

18. The system of Claim 17 further comprising voltage converter means to convert from one voltage level to another.

19. The system of Claim 17 wherein the voltage converter comprises a DC-to-DC Converter.

20. The system of Claim 17 further comprising a filter to remove noise electrical sources.